

CLAIMS

What is claimed is:

1. A method for improved differential electrical noise reduction method for an integrated circuit device having a memory having multiple vertical levels of circuitry, said memory having a plurality of at least four arrays of a plurality of memory cells, each array of memory cells being substantially equally spaced from an adjacent array of memory cells, each array of memory cells including a plurality of memory cells and at least four pairs of digitlines, each pair of digitlines including a first digitline and a second digitline, the first digitline and the second digitline being substantially vertically aligned in an upper conductive level and a lower conductive level of the integrated circuit device, the first digitline and second digitline of each pair of digitlines each connected to an equal number of the memory cells in each array of the plurality of memory cells, the method comprising:

electrically balancing the first digitline and the second digitline of each digitline pair of the at least four pairs of digitlines to balance the electrical noise therebetween by twisting the first digitline and the second digitline of a pair of digitlines of the at least four pairs of digitlines between arrays of the plurality of at least four arrays of memory cells in a twist region located between each array of the plurality of at least four arrays of memory cells, a first pair and a third pair of digitlines of the at least four pairs of digitlines twisted in the twist region located between a first array of memory cells and a second array of memory cells and twisted in the twist region located between a third array of memory cells and a fourth array of memory cells while a second pair of digitlines and a fourth pair of digitlines of the at least four pairs of digitlines are twisted in the twist region located between the second array of memory cells and the third array of memory cells, the electrically balancing including connecting an equal number of memory cells to a portion of one of the first digitline and the second digitline of a pair of digitlines of the at least four pairs of digitlines when located in a lower conductive level of an array of the plurality of at least four arrays of memory cells.

2. The method of claim 1, further comprising:
isolating adjacent memory cells of an array of the plurality of at least four arrays of memory cells
using an isolation region comprising a plurality of isolation transistors, each isolation
transistor having a gate biased to a predetermined voltage.